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This IRCD Bulletin issue contains two brief papers. One, on contingency management, describes the application of this aspect of operant conditioning theory to the manipulation of behavior through reinforcement methods. Examples of the technique of managing high and low probability behaviors are offered as it is used with preschool children, disadvantaged youngsters, adolescents, American Indian preschool children, a nontalking retardate, and a 16-year old inmate of a mental hospital. The second article discusses the use of the Peabody Picture Vocabulary Test with shy and nonverbal children in a nursery school - day care center. Three cases illustrate the need for preparing these children for test-taking through such methods of over-coming shyness as contingency management. (NH)

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CONTINGENCY MANAGEMENT*

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IRCD Bulletin Supplements

This is the second in a series of special supplements to the IRCD Bulletin addressed to problems of concern to educators of disadvantaged pre-school children. It deals with the translation of learning theory into educational practice. More specifically, the current issue illustrates and discusses the developing behavioral technology known as "contingency management." The settings and the problems discussed will be familiar to most readers. The suggested techniques, however, may be new to many. We are grateful to our contributing authors for two interesting and thought-provoking articles.

There are many people in our society—parents and teachers, for example—who have to deal with tremendous amounts of behavior. They have neither the time nor the inclination to become behavioral scientists, but they welcome a small bit of technology which gives them some control over what is going to happen next in the world of behavior.

Contingency management is a crucial bit of technology derived from operant conditioning, but one need not be an operant conditioner to be a contingency manager (sometimes called a behavioral engineer). Often it is only a matter of days, or even hours, until a person has mastered the essentials of effective behavioral control.

The central theme in contingency management is a simple and obvious one: The likelihood that behavior will recur depends on its consequences. To become a skilled contingency manager, one simply has to take this fact seriously enough to observe that it holds for all behaviors, for all organisms, at all times, and that it is important even in the case of seemingly trivial bits of behavior, on the grounds that larger, more important response classes are built from them. As a matter of fact, it seems that the difference between an excellent contingency manager and a not-so-excellent one is a willingness to reinforce approximations early in the game. From the examples of contingency management given below, it is clear that things would not have gone so smoothly without the reinforcement of successive approximations to the final behavior the contingency manager wanted.

Finding Reinforcers

The picture most people conjure up when they think of an operant conditioner working with a child is that of an M & M candy dispenser dressed in a white lab coat. Happily, this stereotype, if it ever had any validity, is now quite old-fashioned, quite out of date.

The reason for this turn of events may be traced to the impetus given this area by the work of David Premack. This is not the place to review Premack's work; suffice it to say that he and others are finding considerable laboratory support for the elegantly simple notion (Premack, 1965, p. 132): "For any pair of responses, the more probable one will reinforce the less probable one." If the contingency manager takes this principle seriously—that is to say, literally—he will have thousands of reinforcers at his disposal where he may have had one or two before.

In the practical application of the Premack principle, one usually doesn't have the time or facilities to define behavior probabilities in terms of relative frequency of occurrence. Thus, the term probability is used in the everyday, nonrigorous sense. Children will often announce, without urging, what their high probability behaviors are at the moment. For example, when a child says, "Let's go for a walk," or "Let's play this game," or when he points to a drawing of a particular event on a menu of reinforcing events (Addison & Homme, 1966), he is informing the contingency manager of what will reinforce at that particular moment. To strengthen a low probability behavior, the contingency manager simply calls for an approximation of it, and then permits a short time for interacting with the reinforcing event.

Some Instances of the Application of Contingency Management with Children.

In practice, the contingency manager specifies a series of micro-contracts which substantively take the form: "Execute some amount of low probability behavior; then you may immediately engage in some high probability behavior for a specified time."

The differential probability hypothesis is notable not only for what it says, but for what it does not say. It does not say: "Of any two responses, the more probable one will reinforce the less probable one in middle-class or upper-class children"; it does not say: ". . . in white children"; it does not say: ". . . in emotionally nondisturbed children"; it does not say: ". . . as long as the S has not come from a different culture." What is being said is that, as long as the S is an organism, the differential probability rule will hold. Happily, as the following examples are intended to illustrate, we seem to be finding this to be the case.

Three Normal Middle-Class Three-Year Olds

Our initial attempt in using the Premack principle proved remarkably effective with three exuberant three-year-olds (Homme, C. de Baca, Devine, Steinhorst, & Rickert, 1963). The high probability behaviors used as reinforcers were of the sort generally suppressed by the environment, e.g., running and screaming. The contracts specified by the contingency manager were of the sort, "Sit quietly and watch what I do at the blackboard; then you may run and scream until the timer goes 'Ding.'" Although, as it should, the technology employed in this initial attempt now looks crude, there can be little doubt that it was effective.

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* A slightly expanded version of this paper appeared in the November, 1966, issue of Newsletter, the Section on Clinical Child Psychology, Division of Clinical Psychology, APA. We wish to thank Newsletter's editor, Dr. Martin Gluck, with whose kind permission we have reprinted the substance of the original article.

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Two Children of Poverty

There is no death of authorities to explain how and why children of the poor are different. To find out if they obeyed a different set of behavioral laws, staff members of this department sought out two Negro boys, five and six, of poor families. It may be argued that these were not "real" slum kids, since our town does not have slums, but they were at least poor.

What was most striking to us in this pilot project was the speed with which these children from a different culture learned middle-class behaviors. They learned instantly, for example, to knock on a door and inquire, "May I come in?" when entering the reinforcing event area was contingent on this behavior. They cheerfully fulfilled small contracts of the usual sort: "Execute some low probability behavior (Find another letter that looks like this one.), and then you can execute some high probability behavior." We were prepared to find that different high probability behaviors would have to be used to reinforce these children, but this was not the case. The usual program of water colors, crayons (after they were shown how to use them), pushing a castor-equipped chair, and so forth, served to reinforce behaviors very nicely.

Twenty-Three Adolescents

Guidance counselors were used to recruit Ss for a study (Homme, 1964) of adolescents who were high school dropouts or judged to be potential dropouts. These adolescents had the behaviors usually associated with "street kids." They spoke a hip jargon, some of them were discovered to be carrying knives, some of them wore their sun glasses at all times, and so on. The low probability behavior for these Ss was getting themselves through programmed instructional material in subjects like arithmetic and reading. Most of the high probability behaviors used to reinforce these were of the conventional sort: time for a break, coffee, smoke, coke, and so on. However, there were some surprises. For some of these Ss, going through a program in Russian proved to be a reliable high probability behavior. When this was discovered, their contracts would take a form like the following: "Do 20 frames of arithmetic; then you can work on Russian for 10 minutes." This does serve to illustrate that one need not know why a high probability behavior exists in order to use it as a reinforcer.

The success of the project was mainly in terms of the excellent motivation exhibited by these Ss. After the first week, there were zero dropouts, and attendance was virtually perfect. Absenses which did occur were all accounted for, and one hundred per cent of them were made up by working extra time. And there were no fights. A generally pleasant emotional atmosphere prevailed, in spite of the fact that these adolescents were of the "hard-to-handle" variety prior to the project.

Four Preschool Indian Children

Indian culture of the southwestern United States has been the subject of intensive and prolonged study. The ways in which American Indian culture differs from non-Indian American culture are real and interesting enough to be studied in their own right. But cultural differences are often used for scapegoat purposes; they are frequently used to explain the failure of conventional teaching methods.

To test the feasibility of a contingency management system (Homme, 1965), staff members went to an Indian reservation[1] and set up a one-room school with two areas: one area for the execution of low probability behaviors; the other for high probability behaviors. The Ss the Governor of the Reservation had picked out for us to work with were the four children judged by him to be the least likely to succeed in school. They had brothers and sisters who had failed or were failing in school, and they were the shyest of all the children on the reservation. The low probability behaviors the contingency managers wanted to strengthen were English vocabulary items (Point to the horse, and say "Horse."), and again the high probability behaviors used to reinforce these were quite conventional ones.

In summary, these preschool Indian children acted as though they were organisms. Further, by the time the six-week project was over, they were as noisy and nonshy as children ought to get. They were seen again about a month after conventional school had begun; their behavior was about what it was when we first saw them. Not all changes are lasting ones.

A Five-Year-Old Nontalking Retardate

Five-year-old Diana (IQ about 43) is about the size of a normal three-year-old. When she was first brought to the laboratory, she had a vocabulary of half a dozen words. Among them was the phrase, "What's that?" This phrase served quite reliably to get action from adults, particularly strangers. Unsuspecting staff secretaries, for example, were often heard giving quite complete, technical descriptions of their electric typewriters. The fact that Diana had comprehended nothing of the explanation, of course, did not stop her from repeating the question while pointing her finger in another direction.

Basically, the same contingency management system which worked with bright three-year-olds was quite satisfactory to Diana. The differences were that she was taught to use the menu by getting her to point at some object, having the object immediately appear. For example, if she pointed to a piece of candy, a piece of candy was immediately given to her; if she pointed at a ball, a ball was immediately rolled to her, and so on. Those familiar with laboratory procedures (Homme & Klaus, 1962) will recognize this as an instance of magazine training.

The low probability behavior we set out to strengthen was imitation of speech. Starting out with the requirement that one sound be approximated before a reinforcing event occurred, the requirement was gradually shifted upwards until the imitation of ten or so words could be demanded before a minute of reinforcing activity was permitted. With this kind of management, her vocabulary increased to around 200 words. But our chief interest in this project was not to see how much behavior we could install; it was rather to see whether contingency management would be effective in the case of a defective organism. It was.[2]

A Blind Sixteen-Year-Old Inmate of a State Mental Hospital

On first coming into contact with contingency management and the Premack principle, students of behavior usually ask, "How do you find high probability behaviors?" The answer is, "Let the S tell you." The more experience we get in this area, the more we are inclined to think that S will always do this. He may not do it verbally, but he will find a way. The following contingency management interaction is illustrative.

When the contingency manager first saw the S, she was sitting quietly in a ward of a state mental hospital. Her chair was against one of the walls, and she was staring straight ahead through sightless eyes just as she had been doing most of her waking hours for the eight years she had been hospitalized. What were her high probability behaviors?

[1] An account of this project is also given in the film, "Teaching English Vocabulary to Preschool Indian Children at the San Felipe Indian Reservation."

[2] This project is described in more detail in the film, "Teaching Verbalization by Operant Conditioning."

There appeared to be none. But when the contingency manager walked over to her and spoke, she indicated what at least one of them was. She seized his hand and smelled the back of it. To condition verbal behavior, the contingency manager simply withheld his hand until some approximation to an acceptable response to the command, "Say X," was executed (where X was some word or phrase). Immediately after the patient verbalized, the contingency manager would give her his hand to smell for a few seconds.

With this kind of management, within an hour, the contingency manager had reinforced sufficiently so that the verbal rate had increased considerably. The hospital's clinical psychologist intern remarked that the patient had never talked so much at one time since he had known her.

Psychotherapy: The Teaching of Self-Management of Contingencies

The Premack principle makes no mention of who should manage the contingencies between high and low probability behaviors. This leaves the way open for the possibility of the S's managing his own contingencies. How much of this kind of technology can be taught to children is simply unknown at the present time, but the possibility exists that some exciting new developments are in store for those who are willing to experiment.

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SHYNESS, NON-SPEAKING, AND THE PPVT

Robert T. Reeback*

[Editor's note: The Peabody Picture Vocabulary Test (PPVT) is a test of "hearing vocabulary" in which the examiner says a word and the test subject indicates his "understanding" of the word by pointing to the appropriate picture, selected from four on a page. This procedure is repeated, through a series of pages and increasingly complex words, until a "ceiling" is reached; that is, until the incidence of error sharply increases. The PPVT has been widely used in assessing disadvantaged youngsters. The incidence of shy and "non-verbal" children is reportedly high for this population, and consequently problems in evoking language from such children are common.]

During the Spring of 1966 I gave the Peabody Picture Vocabulary Test to several 3, 4, and 5 year old children at a nursery school-day care center in the inner city of Rochester, New York. All the children had been selected from economically and otherwise disadvantaged homes; none showed signs of physical handicap. A few of them (including new arrivals) were especially "shy", and occasionally a teacher remarked about a boy or girl, "(So and so) never speaks". A "shy" child in this context could be described as one with whom it was not possible, even after a few days' acquaintance, to simply take his hand, lead him to the testing room, and administer the PPVT. Shyness and non-speaking were not necessarily coincident; various combinations occurred. The children discussed here represent only the extreme cases of shyness, non-speaking, or both that I encountered.

One boy, Danny, age 3:8, was articulate enough to say, "No, I want to go back," when he was first brought to the testing area. On his second trip, there were several "no responses" as well as mistakes in the first ten items of the test. Danny squirmed, pouted, and stared downward, then left the room. On the third attempt, Danny found some plastic cups in the testing room, and brought them to the table. I lined up the cups on one side of the table, then gave them to him one at a time as he responded to test items. There were no "no responses." There were mistakes in early items, but fewer than previously. Danny built a tower with his earned cups. When all five cups had been given out, I simply took them back and started over again. After about the tenth item a cup was given for responding to two items. At no time was receipt of a cup contingent upon a correct response—only upon responding. The 2:1 response:cup ratio was explicit: "Now I'll give you a cup after every two times". After 17 items, I was ready to stop for the day, but Danny wasn't. He whined and said "more. . ." when I started to leave, and we went on to finish 22 items.

The next day, the same procedure, with a quicker step-up to a 2:1 ratio was followed. Also, plastic tops were given, interspersed with the cups. Danny continued to respond when he was approaching the ceiling point and guessed when prompted. All responses, in all Danny's sessions, received verbal support. Danny's performance, and that of others like him, suggests that PPVT test-taking behavior maintained by response-contingent gifts of small toys to manipulate is different from (and in terms of scores, superior to) test behavior maintained only by praise.

Another boy, Kenneth, age 3:10, was both shy and silent. On our first encounter (not the first time Kenneth had seen me) Kenneth did not approach me when his teacher suggested that he "play a game with the man (take the PPVT)." However, Kenneth responded appropriately to the teacher's suggestion that he get a book and sit down and read it with me. At first I read the story to him, then only occasionally read a phrase or a line. Kenneth turned the pages of one picture book after another. Whenever page-turning coincided with my suggestion ". . . turn the page . . .", I said "Good", or "That's right", or the like to Kenneth. There was very little vocalization, though pointing was frequent. After a few minutes, Kenneth did produce "dog" while pointing to one of several dogs. It was after I had heard this utterance that Kenneth's teacher commented that Kenneth never spoke, even when asked if he had to go to the bathroom.

The following day, Kenneth watched and then, when I motioned to him, joined me as I pushed some toy trucks about. He took blocks from me one at a time to put into the trucks. I talked to Kenneth, but he did not speak during this game.

After several days' absence, Kenneth returned to find a new teacher in his old room and his old teacher in a different room. He was quite subdued for a day or so. When I first

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approached him after this period, he had just been riding a tricycle. I asked if he were going to ride anymore. He shook his head. Did he want me to pull him around in the wagon? He nodded, and climbed in. After about a three-minute ride, I stopped the wagon, and asked Kenneth if he wanted to ride anymore. He nodded. I said "say 'go'". Leaning close, I heard a very quiet "go", and I immediately resumed pulling the wagon. I stopped the wagon at variable intervals thereafter, and repeated the sequence. Soon Kenneth was saying "go" as soon as the wagon stopped, without a prompt. Furthermore, he vocalized recognizable approximations to "go back", "(I wanna) get that truck", "get that car", and he produced a fair amount of other, not recognizable, vocalization. Once he shouted, "Go back!" I followed every instruction immediately.

The following day, I wheeled Kenneth to the testing room. There, he remained in the wagon at the doorway, exploring the room visually. He said "go", and "go back" and tried to get the wagon moving backwards. After some urging, he came briefly into the room and very briefly glanced at the PPVT picture book I showed him. Only then did I wheel him back to the free play area, where we had another wagon-ride-contingent-upon-speaking. After this ride I showed Kenneth some pictures: "Here's a tree, and some birds". When Kenneth said "tree" or "bird" (he also said, "That's no tree!"), I patted him on the back, at which he smiled.

Two days later I called for Kenneth to give him the PPVT; his behavior could no longer be described as shy. At the testing room, I led him around and told him to touch nearly all the furniture. Kenneth found some toy cars and trucks and brought them to the table, where he proceeded to name them for me with no prompting whatever; e.g., "yellow truck". At this point, I proceeded with the PPVT, using the cars as response-contingent gifts. Kenneth's attention shifted noticeably to the picture book, even before this gift contingency was established. After each of the first few items I asked Kenneth if he wanted to do more. He always nodded, and shortly he said "... more..." as each item was done.

Although Kenneth observed when I began noting down his responses on the score sheet, this did not interfere with the ongoing activity. Each appropriate, but not necessarily correct, response was also followed by verbal support, and some by pats on the back. When all the cars had been given out, I collected them and started over. When Kenneth's attention shifted more exclusively to the cars and he did not respond to prompting to continue the PPVT, I put the test materials away. In the next few minutes, Kenneth said, among other things, "... men in there", "I wanna see those men", and "I wanna ride that bike." Kenneth had finished about 15 PPVT items in about twenty minutes. His raw score of 13 gave him an interpolated mental age of 2:2, according to the somewhat doubtful rites of interpretation that accompany the PPVT.

This devastating rating made from Kenneth's "hearing vocabulary" contrasts sharply with the several instances of Kenneth's following instructions and responding to questions outside the test situation. His teacher spoke to Kenneth as though he were a bona fide English listener. That Kenneth pointed when told to "put your finger on X" reveals at least as much about his receptive language as does his score on the test. But the merits or flaws of the PPVT aside, and ignoring its content, "reaches ceiling on the PPVT" was a convenient definition of a desirable behavior for youngsters who will be tested often. To reach this terminal behavior in the case of the shyest children required a deliberate program of adaptation to and reinforcement for a variety of approximations to entering the test situation, and the provision of reliable reinforcing consequences for the actual test-taking behavior. In short, shyness was overcome partly by making non-shyness pay off.

An important step in overcoming shyness with Kenneth was to give him the opportunity to control his own environment by speaking. "Go" (yielding wagon-ride) was the key to Kenneth's vocalizing. His first very quiet "go" had to be discriminated by a reinforcing agent (me) in a room full of yelling kids. Thereafter, this child, whose community had already adjusted to him as a non-speaker, spoke frequently.

Another reputed non-speaker I encountered was named Mitchell (4:2). At snack time one day, an ambitious teacher-aide directed her colleague to make Mitchell's additional cookies contingent upon his asking for them. Just what Mitchell was supposed to say was not specified. (Later it was: "Say 'thank you' to Mrs. X".) Even with this much prearrangement, when Mitchell produced a verbal response (perhaps "yes"), the teachers' attention happened to be directed elsewhere. Mitchell's response was not loud enough to draw the attention back. Therefore this verbal response went virtually unreinforced—or at least, by the time he got the cookie,. the contingency of cookie upon speaking was certainly not clear.

The ease with which tentative verbal responses go unnoticed is further dramatized by the incident of a very untalkative little girl at the toy telephone. I picked up the phone and tried to begin a conversation. The girl moved her mouth; it seemed that she was babbling, and she was not looking at me. This did not resemble a play conversation. However, when I hung up the phone and said "bye", she looked at me and mouthed a silent "bye". That response, like Kenneth's "go" and Mitchell's "yes", was extremely easy to miss.

Probably many children remain silent for extended periods of nursery school attendance simply because their approximations to speech are unrecognized or inconsequential. Pulling out speech from such children requires dedicated attention to what vocalizing or near-vocalizing does occur, as well as the arrangement of the environment to provide immediate consequences for "almost talking".

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